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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/918,707	07/31/2001	Marten Ternan	HPOWER-204.1	2467

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EXAMINER	
MCHENRY, KEVIN L	
ART UNIT	**PAPER NUMBER**
1725	

DATE MAILED: 02/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/918,707	TERNAN, MARTEN	
	Examiner	Art Unit	
	Kevin L McHenry	1725	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 40-46 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 40-46 is/are rejected.

7)☒ Claim(s) 40 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 31 July 2001 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference sign(s) not mentioned in the description: 34, 39, 91. A proposed drawing correction, corrected drawings, or amendment to the specification to add the reference sign(s) in the description, are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

2. The disclosure is objected to because of the following informalities:

On page 8, line 8, "stream 24" should be "stream 25"

On page 12, line 2, "42" should be deleted.

Appropriate correction is required.

Claim Objections

3. Claim 40 objected to because of the following informalities:

In claim 40, line 9, "a" is needed between "providing" and "stream".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claims 43-46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 43, 45, and 46 cite in line 1 "The preferential oxidation reactor" of previous claims. However, the previous claims cite a fuel processor with several means, including a preferential oxidation reactor. For examination purposes this language was interpreted to mean "The fuel processor".

6. Claim 44 recites the limitation "the shellside" in line 1 of claim 44. There is insufficient antecedent basis for this limitation in the claim. For examination purposes the examiner interpreted this language to mean "a shellside".

7. Claim 45 recites the limitation "the first stage" in line 2 of claim 45. There is insufficient antecedent basis for this limitation in the claim. For examination purposes the examiner interpreted this language to mean "a first stage".

8. Claim 46 recites the limitation "the first stage" in lines 2-3 of claim 46. There is insufficient antecedent basis for this limitation in the claim. For examination purposes the examiner interpreted this language to mean "a first stage".

9. Claim 45 recites the limitation "the last stage" in lines 2-3 of claim 45. There is insufficient antecedent basis for this limitation in the claim. For examination purposes the examiner interpreted this language to mean "a last stage".

10. Claim 46 recites the limitation "the last stage" in line 2 of claim 46. There is insufficient antecedent basis for this limitation in the claim. For examination purposes the examiner interpreted this language to mean "a last stage".

Claim Rejections - 35 USC § 103

11. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

12. Claims 40-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buswell et al. (U.S.P. 5,360,679) in view of Heil et al. (U.S.P. 5,672,629).

Buswell et al. teach a fuel processor that includes a reformer that reacts fuel and water in a reforming reaction to make reformed hydrogen and carbon monoxide, an evaporator, a water-gas shift reactor, and a single vessel preferential oxidation reactor that provides hydrogen to a fuel cell stack and is integrated by more than one means with the fuel cell stack. The preferential oxidation reactor is cooled by a water stream that is shared with the fuel cell stack (see U.S.P. 5,360,679; particularly Figure 2; column 7, lines 12-17; column 8, lines 26-28, 40-46; column 9, lines 14-32; column 11, lines 51-68; column 12, lines 1-2).

Buswell et al. do not teach that the preferential oxidation reactor is multi-staged, is a tubular reactor, or how coolant flows through the reactor.

Heil et al. teach a multi-stage tubular reactor in which the coolant is passed over the shell side of the tubes in the reactor. Heil et al. teach that this coolant system requires little space (see U.S.P. 5,672,629; particularly Figures 5-6; column 2, lines 16-18; column 7, lines 55-67; column 8, lines 1-13, 47-65). The configuration taught by Heil et al. allows the coolant to flow through the first stage tubes before the tubes of the last

stage, in case one wanted a higher temperature gradient at the first stage, or to have the coolant flow through the tubes of the last stage before those of the first stage, in case one wanted a higher temperature gradient at the last stage.

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the processor of Buswell et al. by the teachings of Heil et al. One would have been motivated to do so in order to provide a structure for a reactor cooling system and to provide a cooling system that requires little space, as taught by Heil et al.

13. Claims 40-42 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buswell et al. (U.S.P. 5,360,679) in view of Skala et al. (U.S.P. 6,132,689).

Buswell et al. teach a fuel processor that includes a reformer that reacts fuel and water in a reforming reaction to make reformed hydrogen and carbon monoxide, an evaporator, a water-gas shift reactor, and a single vessel preferential oxidation reactor that provides hydrogen to a fuel cell stack and is integrated by more than one means with the fuel cell stack. The preferential oxidation reactor is cooled by a water stream that is shared with the fuel cell stack (see U.S.P. 5,360,679; particularly Figure 2; column 7, lines 12-17; column 8, lines 26-28, 40-46; column 9, lines 14-32; column 11, lines 51-68; column 12, lines 1-2).

Buswell et al. do not teach that the preferential oxidation reactor is multi-staged or how coolant flows through the reactor.

Skala et al. teach a mutli-staged reactor in which coolant in a direction opposite to the flow of fuel gas so that the final stage is cooled before the first stage. Skala et al.

teach that this reactor structure is more efficient and avoid hot and cold spots within the reactor (see U.S.P. 6,132,689; particularly column 2, lines 49-63; column 5, lines 40-65; column 6, lines 33-59; column 7, lines 8-17, 31-67; column 8, lines 1-33).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the processor of Buswell et al. by the teachings of Skala et al. One would have been motivated to do so in order to provide a structure for a reactor cooling system and to provide a reactor structure that is more efficient and avoid hot and cold spots, as taught by Heil et al.

14. Claims 40-42 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Buswell et al. (U.S.P. 5,360,679) in view of Wheeler et al. (U.S.P. 6,387,555).

Buswell et al. teach a fuel processor that includes a reformer that reacts fuel and water in a reforming reaction to make reformed hydrogen and carbon monoxide, an evaporator, a water-gas shift reactor, and a single vessel preferential oxidation reactor that provides hydrogen to a fuel cell stack and is integrated by more than one means with the fuel cell stack. The preferential oxidation reactor is cooled by a water stream that is shared with the fuel cell stack (see U.S.P. 5,360,679; particularly Figure 2; column 7, lines 12-17; column 8, lines 26-28, 40-46; column 9, lines 14-32; column 11, lines 51-68; column 12, lines 1-2).

Buswell et al. do not teach that the preferential oxidation reactor is multi-staged or how coolant flows through the reactor.

Wheeler et al. teach a mutli-staged reactor in which coolant in a direction opposite to the flow of fuel gas so that the final stage is cooled before the first stage.

Wheeler et al. teach that this reactor structure allows operation at lower temperatures so that a separate heat exchanger is unnecessary (see U.S.P. 6,387,555; particularly column 3, lines 22-26; column 8, lines 11-21).

It would have been obvious to one of ordinary skill in the art at the time that the applicant's invention was made to have modified the processor of Buswell et al. by the teachings of Wheeler et al. One would have been motivated to do so in order to provide a structure for a reactor cooling system and to provide a reactor structure that allows operation at lower temperatures and negates any necessity for a separate heat exchanger, as taught by Wheeler et al.

Conclusion

15. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Clawson et al. (U.S.P. 6,641,625), Trocciola et al. (U.S.P. 6,010,675), Vanderborgh et al. (U.S.P. 4,650,727), Ukai et al. (U.S.P. 6,562,088), Aoyama et al. (U.S.P. 6,455,008), Savage et al. (U.S.P. 6,579,637), Doan et al. (U.S.P. 6,602,624), Pettit et al. (U.S.P. 6,485,853), Borup et al. (U.S.P. 6,521,204), and Lee et al. (U.S.P. 6,365,289) are cited of interest for illustrating the state of the art in fuel processor and preferential oxidation reactor design.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin L McHenry whose telephone number is (571) 272-1181. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas G Dunn can be reached on (571) 272-1171. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1234.

Kevin McHenry

Kiley Stoner AU 1725
Kiley Stoner 1/24/04